INFORMATION DISCLOSURE STATEMENT

The Examiner is respectfully requested to consider the Supplemental Information Disclosure Statement filed by Applicants on December 29, 2003.

Applicants' attorney has received a post card reflecting the receipt of this Supplemental Information Disclosure Statement by the Patent Office but the Examiner did not indicate that the Information Disclosure Statement had been considered in the present Office Action. If the Examiner is unable to locate this Information Disclosure Statement, please contact the undersigned attorney.

REMARKS

The March 29, 2004 Official Action and the references cited therein have been carefully reviewed. In view of the following remarks, favorable consideration and allowance of this application are respectfully requested.

In the Action, the Examiner has rejected Claims 1-12 under 35 USC 103(a) as being unpatentable over Hottinen et al. (WO 96/24206) in view of Blanchard et al. (US 5,629,929).

The Examiner also rejected Claims 3 and 4 under 35 USC 103(a) as being unpatentable over Hottinen et al. (WO 96/24206) and Blanchard et al. (US 5,629,929), as applied to claim 1, and further in view of Shiba et al. (WO 96/24198 (published 8/8/1996, US 6,134,264).

The objections and rejections summarized above constitute the entirety of objections and rejections raised by the Examiner in the March 29, 2004 Office Action. No other issues are pending in the present application.

Applicants have also added new dependent claims 13-16. Claims 13 and 15 relate to the feature of the invention in which different possible frequency offsets are simultaneously analyzed for the purpose, for example, of detecting any Doppler offset that may be present in the signal to be acquired. Claims 14 and 16 relate to a feature of the invention in which the different possible

frequency shifts are simultaneously analyzed to enable selection of a Doppler offset for a selected output.

NON-OBVIOUSNESS WITH RESPECT TO HOTTINEN ET AL. IN VIEW OF BLANCHARD ET AL.

The Examiner has rejected claims 1-12 under 35 U.S.C. §103(a) as being unpatentable over Hottinen et al. (WO 96/24206) in view of Blanchard et al. (US 5,629,929). Claims 1 and 10 are independent claims.

The Examiner states that for Claims 1, 2, 5-12, Hottinen et al. disclose a communication terminal and a CDMA method implemented with a plurality of filter correlating means each comprising groups of correlators being recognized on the basis of spreading code sequences. Further, the Examiner states that while Hottinen et al. does not specifically disclose zero padded FFT means for operating on the output of a correlating means, Blanchard discloses a despreader comprising zero padded FFT means for operating on the output of the correlating means and to prevent partial correlation errors. Blanchard discloses that the block size can be extended depending on the number of chips of received signals and the number of chips of local reference to be correlated to the FFT size, as in claims 2, 6-8 and 10.

In response to the above points of the Examiner, the following remarks are respectfully submitted for consideration by the Examiner.

In the present application, a bank of time domain code matched filters or correlators in the receiver are replaced by a plurality of shorter length correlators or matched filters, each for correlating a part of the spreading code sequence relating to the signal to be acquired, as set forth in claim 1 and in similar language in claim 10, combined with a Fourier transform (FT). A feature of the invention is that by adding zero padding into the FT, as further recited in Claims 1 and 10, frequency offset (from Doppler) in the received signal can be handled.

Hottinen's system, on the other hand, is simply a parallel matched filter bank with each

correlator being matched to an expected or unique transmitted code (with interference cancellation means 62 removing the mutual correlations). Hottinen's system has no capability to accommodate Doppler frequency offset, as achieved by the FT processing utilized in the applicants' invention. New claims 13-16 have been added to even further highlight this distinction.

The Shiba et al. patent concerns surface acoustic wave (SAW) tapped delay line implementation of the matched filter or correlator. The subject matter of this patent is concerned with reducing the time-sidelobes, which are a major problem with these digitally phase-coded waveforms.

The Blanchard patent is concerned with implementing a time domain correlator by the frequency domain approach whereby both the input and the reference waveform are Fourier Transformed (FT), multiplied and then Inverse Fourier Transformed (IFT) to achieve the time domain output waveform. This system is then augmented with a frequency domain limiter (58) which whitens the spectrum to achieve rapid interference cancellation but does not address the Doppler issues of the 2D search plane (Figure 1 of the present application) in the reception of mobile CDMA signals. Thus, Blanchard's zero-padding is for an entirely different purpose from the applicants' claimed terminal and method. Again, new claims 13-16 have been added to even further highlight this distinction.

Neither Hottinen et al. nor Blanchard et al. address the problem of achieving tolerance to Doppler frequency offset, as present in product claims 1, 6, 7 and 8, and method claim 10.

The applicants' receiver design (Figure 3 of the present application, when augmented by increasing N appropriately so that $N > P$) has been developed to achieve Doppler tolerance and thus has enhanced capability as compared to Hottinen for detecting an individual coded waveform. The applicants have incorporated enhanced frequency domain processing into a tapped delay line matched filter structure and thus the claimed implementation follows neither the Hottinen nor Blanchard approach but is, instead, quite unique.

As for present claim 11, Hottinen's boxes 61a-61c are a pseudo noise coded matched filter bank, see his figures 4a, 4b, and 6, and not FFTs as in the present application. The applicants' FFT gives *additional* outputs from each filter and permits one to pick or select the maximum signal (for the output corresponding to the Doppler frequency offset which is present). As set forth in claims 13 and 15, Applicants' arrangement permits different possible frequency offsets to be simultaneously analyzed, for the purpose, as further provided in claims 15 and 16, of detecting any Doppler offset that is present. This is quite different to either Hottinen or Blanchard's approaches and is not obvious to one of ordinary skill in the art.

NON-OBVIOUSNESS WITH RESPECT TO HOTTINEN ET AL. AND BLANCHARD ET AL IN VIEW OF SHIBA ET AL.

The Examiner has rejected claims 3 and 4 under 35 U.S.C. §103(a) as being unpatentable over Hottinen et al. (WO 96/24206) and Blanchard et al. (US 5,629,929) as applied to claim 1, and further in view of Shiba et al. (WO 96/24198, published August 8, 1996, US 6,134,264). The Examiner relates that Blanchard discloses that the chip length and the number of correlators define the length of the spreading size (page 50, lines 5-9, <WO 96/24198> or col. 5, lines 66 through col. 6, lines 1-27 <US 6,134,264>). The Examiner further states that the chip length of correlators is old and known to a skilled artisan with regard to the concept that the longer the chip length or spreading code bit length, the higher the detected SNR (signal-to-noise ratio) and the longer the spread process gain; and moreover, that Shiba et al. disclose a communication device having a chip length of 25. For these reasons, the Examiner concludes that it would have been obvious to one skilled in the art, at the time of the invention, to be able to keep the chip length of correlators to a desired length in order to acquire longer spread process gain.

The presently claimed invention is quite different. Indeed, the present invention provides unique capabilities to detect a signal corrupted by a Doppler frequency offset. Had Blanchard been interested in achieving this capability, zero-padding would have been applied in an attempt to achieve such result, but Blanchard instead concentrates on achieving cancellation of high level narrowband interference. In the present invention, the coded signal is split over a number of cascaded correlators and then the multiple outputs are processed in the FFT to achieve the

tolerance to frequency offset. This short partial code length of 25 is applied to the present invention rather than the full code length of Hottinen (PN) and Blanchard (1-M). Claim 1 specifically recites that each of a plurality of correlating means is for correlating a part of a spreading code. Claim 10 provides similar language in method terminology.

In summary, no combination of the teaching of Hottinen and Blanchard would lead to the Doppler tolerance demonstrated in the present invention. It is respectfully urged that this case be placed in condition for allowance. In the event the Examiner is not persuaded as to the allowability of any claim, and it appears that an outstanding issue may be resolved through a telephone interview, the Examiner is requested to telephone the undersigned attorney at the phone number given below.

Respectfully submitted,
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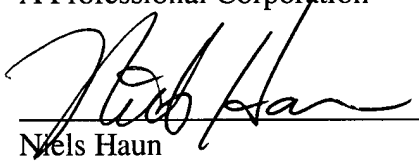

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